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# Cutting for Profit in Southern Pine Woodlands.....



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**W**oodlands can yield steady profits to farmers who find time to make improvement and harvest cuttings. The opportunities are especially good where the farm woods contain shortleaf and loblolly pines. These pines are among the fastest growing timber trees in this country.

Opportunities for income from farm woodlands have improved in recent years. Prices obtainable for logs, poles, and pulpwood or chemical wood have increased greatly. In fact, wood prices have gone up faster than the prices of any other common building material. The cash return for time spent in woods work will probably be greater, per hour, than the return for other farm work.

Besides getting quick cash returns farmers can increase the value of standing timber by proper cutting. In crowded stands, removing the poorer trees makes space for the best trees to grow faster.

This bulletin applies only to mixed second-growth woodlands of loblolly pine, shortleaf pine, and hardwoods. It does not hold for slash and longleaf pine. The recommendations apply especially in Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, east Texas, and Tennessee. Generally, loblolly pine grows best in the Coastal Plain and lower Piedmont; shortleaf does best in the uplands, including the Piedmont and lower mountain sections.

This bulletin supersedes Leaflet 153, How to Cut Southern Farm Timber for Steady Profit.

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# CUTTING FOR PROFIT IN SOUTHERN PINE WOODLANDS

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**Y**OU CAN manage your woodland for steady cash income year in and year out, just as you manage your farm, store, or other business.

Each woodland, like each farm or business, has its own problems. But if your woods is like most of the second-growth forests of mixed shortleaf and loblolly pines and upland hardwoods, then it has two faults: it is not growing enough timber, and the trees that do grow are not good enough.

This bulletin tells how to improve your forest and make it pay a great deal more money than it now does. The way to do this is by cutting (figs. 1 and 2) salable trees of poor quality that should be removed and by holding good-quality trees until they are ripe for harvesting.

Improving your woodland in this way will call for very little cash outlay. The chief cost will be your own labor. Much of the work will be in harvesting timber and delivering it to market, and this of course will bring an immediate cash return. The rest of your time will be spent in getting the forest in shape for larger harvests in the years to come. This part of your work will be an investment—one of the best that you can make.

## HOW SHOULD TIMBER BE HARVESTED?

The timber harvesting recommended here is really a thinning, weeding, and improvement operation, but it also produces salable products. It means thinning clumps of trees of all sizes regularly every few years, and at the same time cutting out poor, scrubby, and over-crowded trees that would only hold back the better ones. Such thinning and cutting will put your younger stands in shape for increased future growth. It keeps the best-quality, fastest-growing trees of



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FIGURE 1.—This well-stocked pine forest is being cut every 5 years. Each cut takes out some ripe trees and the poor ones, and makes room for good thrifty trees of all sizes to grow. In this way, cutting builds up the stand so that every cut brings more and better products than the one before. High-grade poles and piling soon will be cut also. *This forest is managed as it should be.*

all sizes for harvest when they mature for saw timber or for other products.

In cutting, you size up each tree and cut it or leave it according to its good points or bad, its effect on neighboring trees, and what it will add to the total cut you plan to make.

Timber harvesting has these aims:

**To get a good return from the forest year after year.**—Your trees will be an annual farm crop if you cut each year on only a part of your forest and select the stands that need cutting the most.



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FIGURE 2.—This tract was "clear-cut." The farmer sold all his timber for a lump sum, with no idea of how much wood he had or what it was worth. He will receive no further income for many years. *This forest is not managed at all, but destroyed.*

**To get a good cash return from each cutting.**—You will make the most money by cutting each tree into the most valuable products it can make, using as much as possible of the tree.

**To increase the number of good trees and the size of salable trees.**—If you cut more wood than you grow and take the best and largest trees each year, your woodland will get poorer and poorer. A better plan is to increase the number of large, top-quality trees by cutting *less* wood than grows and by saving many of the large, high-quality trees to grow larger. Young, thrifty trees increase in gross value from 20 to 40 percent annually and rapidly grow into large saw-timber trees. If fires are kept out, nature usually will sow and grow an abundant crop of seedlings in the forest openings without cost (fig. 3).

**To improve timber quality and growing conditions.**—Removing crooked, limby, and diseased pines and the poorer hardwoods increases growth on the best-formed and most vigorous trees.



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FIGURE 3.—Nature sowed and grew this crop of seedlings. By keeping out fire and by cutting or girdling the poor-grade hardwoods in the background, the owner can bring the overtapped seedlings to pulpwood size in about 15 years. Pine seedlings probably will not survive in the dense stand of pine in the foreground, but they are not needed. In all openings they make full use of the soil. These seedlings can be profitably thinned when they reach pulpwood size and thereafter thinned at 5-year intervals.

## DOES IT PAY TO GROW AND HARVEST TIMBER?

But does it pay to cut timber so as to improve the stand? It *has* paid on the Farm Forestry Forty, a 40-acre woodland on the Crossett Experimental Forest in southern Arkansas. The United States Forest Service, which manages this woodland, has made a cut on it each year since 1937 (fig. 4). The Forty had a good stand of saw-timber trees to begin with—6,000 feet (Doyle rule) per acre—and the amount of yearly growth per acre was satisfactory. Each yearly cut took as much wood as grew during the year. Today the Forty has as much timber as when cutting began. And it is better timber, too, for the first cuts took out the low-grade wood. The harvest in 1950 was as follows:

Product and yield per acre:	Value per acre As stumpage <sup>1</sup>	Delivered
Sawlogs, 300 board feet	\$9.85	\$14.39
Pulpwood (pine), 0.10 cord	.23	1.24
Fuel wood (hardwood), 0.50 cord	.25	5.56
Fence posts, 1 post	.04	.12
Total	10.37	21.31

<sup>1</sup> "As stumpage" means as standing trees.

In the 13 years since cutting began, the Forty has yielded wood that was worth \$2,831 on the stump. Delivered to the market it brought \$8,443. This means that each acre each year returned \$5.50 stumpage value, or about \$16.25 when timber was cut and delivered to the market.

The main reason that the Forty pays so well is that it is well stocked with good trees. Most small woodlands are not well stocked. In a forest that has been badly mistreated, it may be 20 years or longer before the first sawlogs can be sold.

Even so, improvement cutting for fuel, posts, or pulpwood will give some returns now and will improve a woodland through the years until it is finally growing good wood at top speed.

To see how long it would take to build up a depleted farm woodland, a poor farm forestry forty was also selected on the Crossett Experimental Forest. In 1938, it had only about 2,000 feet (Doyle rule) per acre of small pine saw timber and was cluttered up with poor hardwoods. Heavy burning had left practically no pine seedlings.

But a light cut was made each year and by 1950 the volume of pine saw timber had increased to 3,500 feet. Meanwhile, the hardwoods had been eliminated. In the 12 years since cutting began, the poor forty yielded wood worth \$39 an acre on the stump, or about \$3.25 an acre per year. Delivered to the market, the wood brought about \$115 an acre, or about \$9.50 an acre per year. The cut in 1950 had a value of \$8.50 an acre as stumpage and \$13 an acre when the timber was cut and delivered to the market. During the 12 years, abundant pine seedlings established themselves and grew almost to pulpwood size.

Judging from results of the poor farm forestry forty, even farmers with poor stands of pine timber will be well on their way toward good, steady returns if they weed out their low-grade hardwoods and poor pines, keep out fire, and make frequent light cuttings. Once their woodland is built up, they can cut timber every year or every few years, and each time the products will be better.

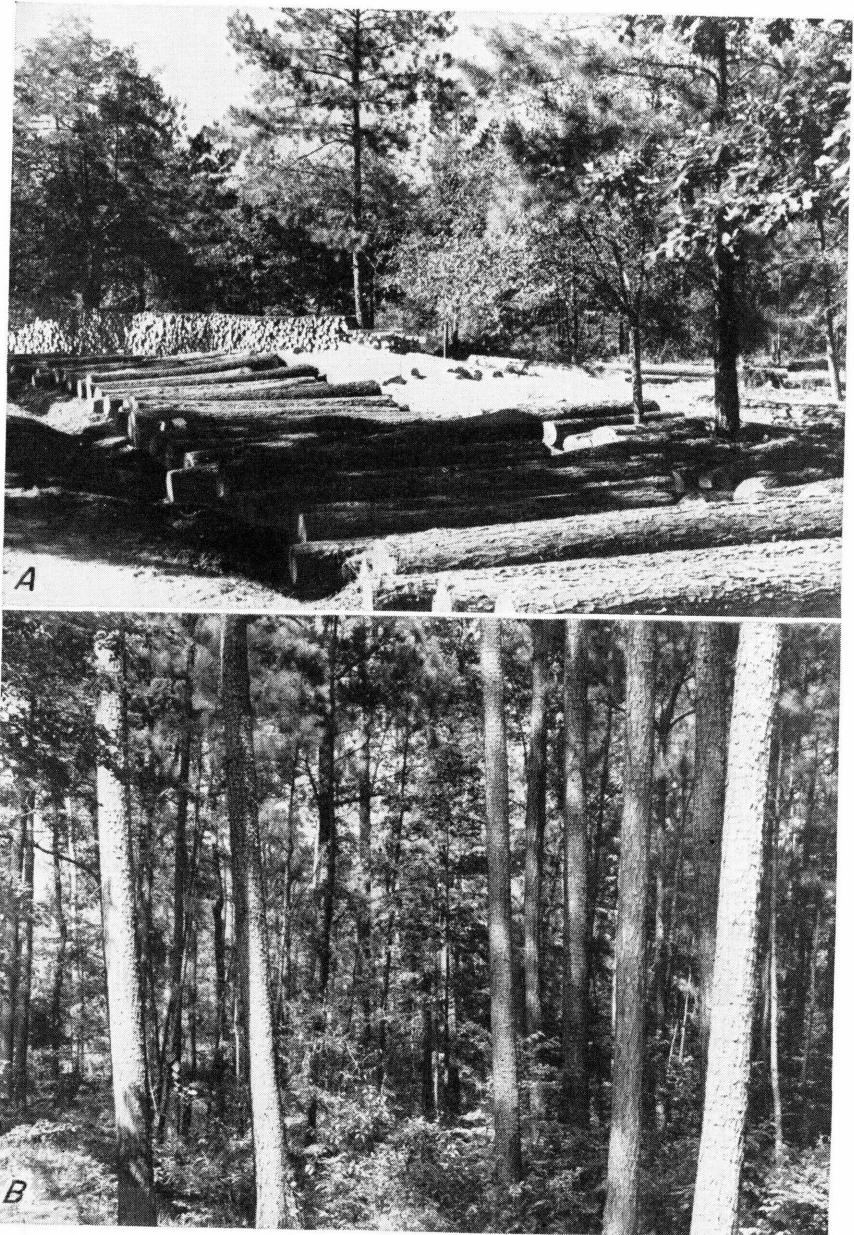


FIGURE 4.—A, This bank of logs and pulpwood is 1 year's growth on 40 acres of well-stocked shortleaf-loblolly pine-hardwood land at Crossett, Ark. B, This is the stand from which the wood shown in A was taken as the fourth annual cutting of 1 year's growth.

## MEASURE YOUR FOREST

You can make the first cut simply by marking the trees that should be cut to improve the stand (fig. 5). It isn't necessary to take an inventory of the timber before this first improvement cut.

But before the next cut, you should find out how much saw timber you have (fig. 6). In the timber business, as in any other business, an



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FIGURE 5.—Take a good look at your trees before cutting. The seedlings, saplings, and even pulpwood-size trees in this forest have little present value but will become the future crop trees. Some pulpwood trees should be cut to make the remaining ones grow better. Most of the saw-timber trees in this picture are too small and are growing too fast in volume and in value to cut now.

occasional inventory of the stock on hand—the salable timber in your case—is required. Ask the State Forester or Extension Forester for help in measuring the forest. Tally all the trees of sawlog size just before cutting, keeping a separate record of the trees you mark for cutting. From this tally you can determine how many board feet of



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FIGURE 6.—Knowing how much timber you have is very important. This man is measuring the diameter at breast height ( $4\frac{1}{2}$  feet above ground) with timber calipers. Calipers or other measuring sticks can be bought or made at home. Inquire of your State Forester or Extension Forester.

sawlogs are in the stand and check how much you are cutting. Finally, comparing the volume immediately after cutting with the volume 5 years later will tell how fast the timber is growing. This will also show about how much to cut next time.

Here are some hints on how to tally and figure board-foot volumes of standing saw timber:

1. Measure the diameter of each saw-timber tree to the nearest inch. Usually, only pine trees 9 inches or larger and good hardwoods 12 inches or larger in diameter at breast height ( $4\frac{1}{2}$  feet above the ground) are cut as saw timber. The State Forester or Extension Forester can tell you where to buy a measuring stick to give diameters direct. Or, it is possible to measure around the tree with a tape and then divide this circumference by 3 to get the approximate diameter. Home-made calipers like those in figure 7 also work very well.

2. Estimate the number of logs (16-foot logs) in each saw-timber tree to the nearest one-half log. Standing a 17-foot pole (16-foot log plus 1-foot stump) beside the tree helps to gage the number of logs.

3. Tally each saw-timber tree by its diameter at breast height and by the number of logs it will make. Tally the pine and good hardwoods separately. A sheet like the one shown in figure 8 is handy. To tally a tree, put a dot in the right square.

TABLE 1.—*Average board-foot (Doyle)<sup>1</sup> volume per tree<sup>2</sup> of forest-grown loblolly-shorleaf pine*

Diameter at breast height (inches)	Gross volume when number of 16-foot logs is—						
	1	1½	2	2½	3	3½	4
	Board feet	Board feet	Board feet	Board feet	Board feet	Board feet	Board feet
9-----	16	24	32	40	48	-----	-----
10-----	16	24	32	40	48	-----	-----
11-----	20	25	32	40	48	-----	-----
12-----	26	34	43	50	57	-----	-----
13-----	35	46	59	70	80	-----	-----
14-----	44	59	75	89	104	-----	-----
15-----	56	74	96	112	132	-----	-----
16-----	67	90	116	136	161	-----	-----
17-----	80	110	140	166	198	-----	-----
18-----	94	129	164	198	234	-----	-----
19-----	110	151	194	234	278	-----	-----
20-----	121	166	216	261	308	348	391
21-----	138	192	248	302	358	403	452
22-----	156	216	280	344	407	458	514
23-----	176	245	320	388	464	521	582
24-----	196	273	359	433	520	583	650
25-----	218	306	400	486	578	655	737
26-----	240	340	441	539	636	727	824
27-----	264	374	490	594	707	806	912
28-----	289	408	538	650	778	885	1,000

<sup>1</sup> Logs less than 8 inches in diameter inside bark are given a volume in board feet equal to their length in feet. This is common practice.

<sup>2</sup> Estimated by Clement Mesavage, Southern Forest Experiment Station, 1947.

4. Knowing the diameter at breast height of a tree and the number of logs in it, you can learn the number of board feet from table 1. For example, a tree 16 inches in diameter and with 2 logs in it has a volume of 116 board feet. The table can be used for hardwoods as well as for pine.

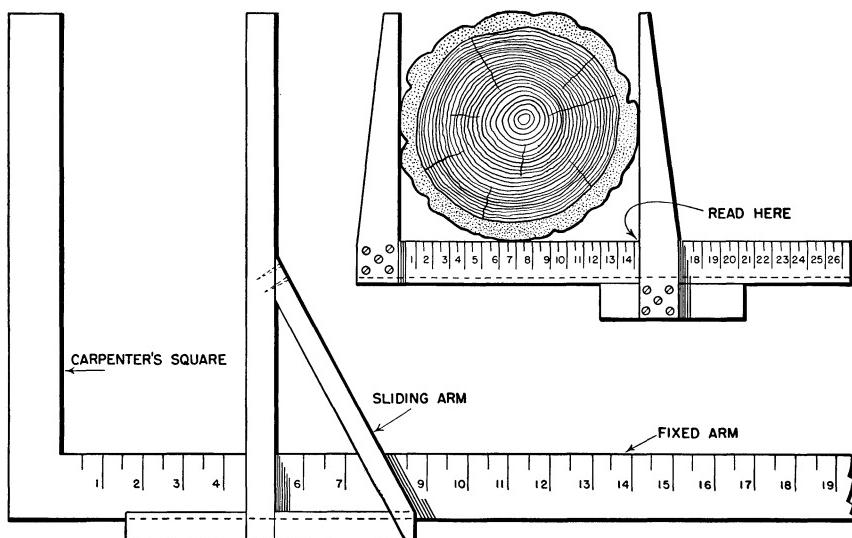


FIGURE 7.—Calipers like these can easily be made at home. The one at the left is made by putting a sliding arm on a steel square.

Tree diameter at breast height (inches)	Number of 16-foot logs						
	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

FIGURE 8.—A tally sheet for standing timber.

5. Now go back to the tally sheet and find out how much timber each square represents. Say the first square, for 1-log trees 9 inches in diameter, has 11 dots in it. Find out from table 1 how many board feet one such tree contains and multiply by 11. And so on through the tally sheet. The sum of all the squares is the amount of saw timber in the forest.

The directions given above apply only to measuring saw timber. Measuring pulpwood or fuel wood in standing trees and in tops of the saw-timber trees is not covered here. To measure the volume of pulpwood, or of poles, or other products, ask the State Forester or Extension Forester for help.

## TAKE A GOOD LOOK AT YOUR TREES

To cut for a good income now and still provide for future cuts of greater value, you must know the worth of the trees and also the shortcomings of your forest. Are most of the trees growing vigorously, and do they have one or more smooth logs clear of limbs? Are there trees of many sizes so that some will be ready for cutting each year? Are the ground space and air space fully used by trees so that there are no open areas growing nothing or cluttered up with worthless hardwood brush?

Your woodland should have the following classes of pine trees:

**Seedlings** come in naturally when openings are made by cutting larger trees. Are the forest openings filled with them? If not, are there seed trees with cones on them? Perhaps fire has destroyed the seedlings. Or it may be necessary to girdle or cut down overtopping hardwoods that are crowding out the seedlings. If there are too few seed trees—2 or less per acre—planting seedlings is advisable. Don't worry about seedlings if all the space in the forest is occupied with older pines.

**Saplings** are the young trees, older than seedlings but not yet salable for pulpwood. Many of these will grow to pulpwood size during the next 5 to 10 years. If you don't have them, you will have to wait 10 to 20 years for seedlings to grow to pulpwood size. You are ahead, however, if, instead of saplings, older trees are occupying the ground.

**Pulpwood trees** (over 5 inches in diameter) are large enough to cut for pulpwood or fence posts but are below sawlog size. They generally are growing rapidly in both volume and value. The best pines should be kept growing for future sawlog timber, and the defective and rough, limby ones should be cut. Overcrowded groups should be thinned, leaving the best trees spaced about 12 feet apart for 6-inch trees and up to 16 feet apart for 10-inch trees. With open-grown, limby trees 5 to 8 inches in diameter, limbs can be profitably pruned off the lower 17 feet of trunk, provided this does not remove limbs from more than two-thirds the total height of the trunk. Not more than the lower third of the live crown or top should be pruned at one time. These smaller trees will cover the knots with layers of wood from which clear lumber can be cut. It doesn't pay to prune larger trees.

From a fifth to a third of the forest should be occupied with groups of pulpwood trees.

**Sawlog trees** include all trees from which sawlogs can be cut. They are usually at least 9 inches in diameter. Values of sawlog trees vary greatly with size. A 16-inch, 3-log tree (see table 1) will scale about ten times as many board feet as a 10-inch, 1-log tree, and the grade and value of the logs per thousand board feet will be much higher for the 16-inch tree.

Since it takes a 10-inch tree with good growing space only about 20 years to grow to 16 inches in diameter, it pays to hold 10-inch trees for this tenfold volume and even greater value increase, unless they need to be cut to improve growing conditions in the stand.

Values depend also on quality of logs. Mills pay more for clear, high-grade logs that yield high-grade lumber, or possibly veneer. Small logs usually make poor lumber and costs of logging and milling them are high. Large rough logs with many knots also yield low-grade lumber.

At least a half of the forest area should be in saw timber. The more trees there are of sawlog size the more valuable is your stand. It will pay to hold as much of the young timber as possible to grow into larger, better timber and also to hold smooth medium-sized trees for further growth. But the rough, large trees and also the medium-sized and small, rough, low-quality trees which are holding back good trees should be removed. In order to build up the number and volume of good sawlog trees, cut less wood than will be replaced by growth before the next cut.

**Pole trees** include the straightest, clean-boled trees, from which telephone poles and piling can be cut. These are the most valuable trees and it will pay to grow them large enough so that very long poles can be cut. The aim in management should be to grow as many pole trees as possible.

There will also be hardwoods of various sizes. Generally they are less valuable than pines and should be cut to favor the pines. Some good oaks, gums, and other merchantable hardwoods may be valuable as sawlogs. Find out what local markets will take and then favor the good trees of these species in your stands. Usually, however, the problem is to get rid of poor hardwoods rather than to grow good hardwoods.

## WHAT TO CUT

First, be sure you have a buyer for your timber. Marketing and sales contracts are covered in later sections of this bulletin.

After tallying the timber and getting a good idea of the value of the trees, you are ready to take a paint brush and bucket of paint and mark the trees for cutting. Put two paint spots on each tree that is to be cut, one below stump height for checking after cutting, and one several feet up the trunk for the cutters to see. No cutting should be done until all marking is finished.

**Don't mark all of the good trees, but cut to improve your forest.**—First, take out diseased, crooked, rough, and crowded trees so that the forest will be in better shape at the next cut. Doing this will increase both present and future income. These improvement cuts usually return a good income, especially if each tree is cut into the product that will be worth the most—poles, sawlogs, ties, pulpwood,

or fuel wood—and if each tree is used as completely as possible. Cull trees that are not salable should be cut for fuel wood or girdled.

Here are some rules for improving the forest by cuttings:

1. Cut trees that appear weak and certain to die before the next cutting—trees that are not getting the light and ground space they should have.

2. Cut leaning trees and those that may be blown down because of fire scars and other injuries (fig. 9, A).

3. Cut trees that have red heart (fig. 9, B), or other disease, or that are being attacked by bark beetles or any other serious pest.



F-350877

FIGURE 9.—A, Leaning tree with fire scar. B, Tree with red heart. These trees should be cut to give better ones growing room.

4. If they are not needed for seed, cut very limby trees that would never make good lumber (fig. 10).

5. Cut crooked trees that will never grow up to be high-quality saw timber. If the little crooked trees do not crowd good trees, however, they can be left to grow bigger for pulpwood or fuel.

6. Cut less valuable trees, especially hardwoods, if they are crowding the more valuable ones. If you can't sell such trees, get your own fuel wood from them. If there are more than you need for fuel, girdle or poison them.

7. Thin out areas that are too crowded—cut some of the poorer trees to give the better ones a chance to grow up.



F-350873

FIGURE 10.—A limby tree like this will never produce good lumber. It should be cut. It will be less valuable for sawlogs or pulpwood as the limbs get bigger.

8. Cut old trees that have slowed up in growth, even though they are not crowding other trees.

*In addition to the poor trees, also cut some mature or nearly mature good trees for income (fig. 11).*

Be sure that the total cut of good and poor trees together is not more than will grow back in 5 years. If the stand is lightly stocked, cut less than is growing. Find out what mill men and wood buyers in the neighborhood want and what price they will pay. Then go through the stand and decide carefully which of the good trees to cut for income.

Pick out the best straight trees from which poles at least 60 feet long can be cut. If there are enough of these trees for a pole sale, they will very likely return more money than if cut for sawlogs.

If you are lucky enough to have some stands of large trees 16 to 20 inches in diameter or larger, cut such trees in groups, if possible, to reduce logging costs and to make openings where pine seeds will fall and grow. Cut other groups of these large trees in later years.



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FIGURE 11.—This mature 20-inch tree was cut for sawlogs. Cutting pulpwood from the top increased the profit. *A* shows the top before, and *B* after the owner cut 16 sticks of pulpwood scaling  $\frac{1}{4}$  cord. Additional cash income can usually be obtained by cutting pulpwood from the tops of pine, and cutting reduces the chance of fire.

As long as they have space to grow, don't cut young, straight, clean trees before they are big enough to make long poles (60 feet or longer) or until they are at least 18 inches in diameter if used for sawlogs. As young trees, they have little value and will certainly be more profitable later.

Don't cut all the good trees at any one time. If you do, it will make another cut impossible for years, reduce the value of the next cut, and leave the poorer trees to reseed the area.

To get the greatest cash income, be sure to use the tops for pulpwood or fuel wood.

## HOW MUCH TO CUT

The simplest and best rule for cutting is: *Cut lightly so that you can cut often.*

If your woodland is fully stocked, that is, with trees of many size classes occupying and fully using the soil and air space, then it is all right to cut as much as grows. Most stands, however, are understocked, especially as to saw-timber trees. If yours is, build it up by cutting less than is growing. Get the defective and low-grade trees out as soon as possible so that a good young stand can come in. If your woodland is made up mostly of such low-grade trees, make a heavy cut regardless of the stocking after cutting.

## SAW TIMBER

The tally of the stand will give the volume of your saw-timber growing stock. In most second-growth mixtures of loblolly and shortleaf pine and hardwoods, if you cut one-fifth of the volume, growth will have brought the stand back in 5 years to a volume at least equal to that before the cut. For example, if the stand has 5,000 board feet per acre, it is safe to cut 1,000 feet of saw timber. In 5 years the 4,000 feet per acre will have grown back to at least 5,000 feet. If you have no tally of your timber, you still can do a reasonably good job by cutting roughly about *one tree in five* in the merchantable size classes.

In making this cut, first take out the crooked, diseased, and limby trees. Suppose they make up 500 board feet per acre. Then select and cut out 500 feet more per acre of good merchantable timber. There's a thousand board feet, and the forest will be better and bigger 5 years later, ready for another cut.

Following are general guides for cuts at 5-year intervals:

1. In light stands (below 3,000 board feet per acre), cut *one-sixth* of the saw-timber volume, or about 300 to 500 board feet per acre. This will definitely be less than the growth, and will let the volume of timber increase.

2. In medium stands, cut *one-fifth*.

3. In heavy stands (over 6,000 board feet per acre), cut *one-fourth*, or about 1,500 to 2,000 board feet per acre.

## TIMBER BELOW SAWLOG SIZE

Trees under sawlog size are cut not only to improve growing conditions in the stand and to use the trees before they die, but also to

realize an income. To tell how much to cut, first decide what trees should be left to grow. These are the "crop" trees for future cuts. The cut should come from the rest of the trees.

**1. Crop trees should be the best individuals.** Pines are generally more valuable than hardwoods. Crop trees should be straight, clean, and thrifty (fig. 12).



F-363612

FIGURE 12.—In this cut for pulpwood, the best trees were left for crop trees; they are well spaced for rapid growth. The tree in the right foreground is limby and probably should have been cut, but no better tree is growing nearby.

**2. Crop trees should be well spaced.** A rule of thumb is that, after thinning, spacing in feet between two trees should equal their average diameter in inches plus six ( $D+6$ ). For example, the spacing between a 6- and an 8-inch tree is figured this way:  $6+8\div 2=7$ .  $7+6=13$  feet.

Another rule for the same purpose is that the space between crowns after thinning should be one-half of the average width of crowns of the trees left. For example, a group of tree crowns averaging 10 feet in diameter should have a 5-foot open space between crowns.

Rules for spacing should never be followed rigidly, however, and the judgment of a man on the ground is the best. After all, leaving the good trees is more important than uniform spacing.

## HOW OFTEN TO CUT

Where you can keep an eye on things and where your cuts can be light, you can cut again in 3 to 6 years. Don't wait more than 10 years. It depends on how fast the trees are growing, how much timber there is now, and how much was taken out in the first place. Do not make a second cut until growth has restored the stand to a volume at least equal to what it was before the first cut.

Until you find out what cutting period is best for your forest, it is safe to assume that you will cut again after 5 years. Then go ahead and mark and cut 20 percent of the volume of your present stand. By dividing your forest into 5 parts you can cut one of them each year.

## HARVESTING AND MARKETING

There are three ways of selling your timber:

Sell it standing, as stumpage.

Fell the trees, cut the logs, poles, pulpwood, or other products and sell them at the stump.

Cut the products and sell them delivered to the road, railroad siding, or mill.

Generally, it will pay to do as much of the logging as you can, and the added value of the logs in the market will be wages to you. The returns per hour probably will be more than for farming.

Selling timber on the stump is like selling cotton in the boll. If you can cut and deliver your sawlogs and pulpwood to the mills, as you pick and deliver your cotton to the gin, then the check you receive includes pay not only for the wood but for your work in producing sawlogs and pulpwood and for use of your team and truck (fig. 13). It is important, though, to have a buyer lined up before you do any cutting. He may have certain specifications as to length and size, and, anyway, decay sets in so fast that the cut wood may spoil while you are looking for a buyer.

If you cannot harvest the trees yourself, or don't want to, you can sell the marked trees "lump sum" to the highest bidder. If his bid is not high enough, or if you do not know how much timber you have marked, it is better to have him pay according to the amount of wood he actually gets out of the marked trees.

No matter which way you sell the timber, though, the surest way of getting a fair price is to *ask several prospective buyers for bids*. To do this, it is best to know the volume of the marked trees.

As explained previously, the volume of saw-timber trees can be measured before the trees are cut. The logs can also be measured after they have been cut. Your State Forester or Extension Forester will know where to purchase a Doyle log-scale stick. You can, however, use any rule to measure the logs across the average diameter inside bark at the small end to the nearest inch. Tally in a notebook

the average diameter and length of each log and later look up the volumes in table 2, below, which shows contents of logs of various diameters and lengths.



F-343674

FIGURE 13.—By cutting and delivering pulpwood, you will receive about five times as much as from selling pulpwood stumpage. For sawlogs delivered to the mill you can usually get twice what you would get for stumpage.

TABLE 2.—*The contents of logs in board feet, by the Doyle log rule*<sup>1</sup>

Diameter of log at small end, inside bark (inches)	Contents when log length is—					
	8 feet	10 feet	12 feet	14 feet	16 feet	18 feet
	Board feet	Board feet	Board feet	Board feet	Board feet	Board feet
6	8	10	12	14	16	18
7	8	10	12	14	16	18
8	8	10	12	14	16	18
9	12	16	19	22	25	28
10	18	22	27	31	36	40
11	24	31	37	43	46	55
12	32	40	48	56	64	72
13	40	51	61	71	81	91
14	50	62	75	87	100	112
15	60	76	91	106	121	136
16	72	90	108	126	144	162
17	84	106	127	148	169	190
18	98	122	147	171	196	220
19	112	141	169	197	225	253
20	128	160	192	224	256	288

<sup>1</sup> Logs less than 8 inches in diameter are given volumes in board feet equal to their length in feet.

Pulpwood can also be measured in standing trees, but it is harder to do so. If you wish to sell pulpwood "lump sum," ask your State Forester or Extension Forester for help. When trees are sold for poles, ties, pulpwood, or anything except logs, it is generally best to measure the products after cutting.

Pulpwood and fuel wood are usually stacked for measurement. A cord of stacked wood is 8 feet long, 4 feet high, and 4 feet wide. A "unit" is also 8 feet long and 4 feet high, but the width varies with the length of wood the buyer wants. In pulpwood, it is often 5 feet or longer. Piling, poles, posts, and cross ties are usually sold by the piece, with bigger, longer items bringing the best price.

## SELL UNDER A SALES CONTRACT

Whether you sell standing trees or products after cutting, you are making a business deal and should keep a record in writing of all agreements. When you sell, be sure to draw up a sales contract with the buyer. *Do not cut or allow any cutting until a sales contract has been signed.* A sample contract for a lump-sum sale of standing marked trees is shown below.

### SAMPLE TIMBER SALE AGREEMENT

-----, of -----, (Post office) -----, (State)  
(I or we) (Name of purchaser) (Post office) (State)  
hereinafter called the purchaser, agree to purchase from -----  
(Seller's name)  
----- of -----, (Post office) -----, (State) hereinafter called  
the seller, the designated trees from the area described below.

#### I. Description of Sale Area:

(Describe by legal subdivisions, if surveyed, and approximate, if not)

#### II. Trees designated for cutting:

All ----- trees marked by the seller, or his agent, with paint spots  
(Species)  
below stump height; also dead trees of the same species which are merchantable  
for ----- (Kind of forest products)

#### III. Conditions of Sale:

##### A. The purchaser agrees to the following:

1. To pay the seller the sum of \$----- for the above-described  
trees and to make payments in advance of cutting in amounts of at least  
\$----- each.

2. To waive all claim to the above-described trees unless they are cut and  
removed on or before ----- (Date)

3. To do all in his power to prevent and suppress forest fires on or threatening  
the Sale Area.

4. To protect from unnecessary injury young growth and other trees not  
designated for cutting.

5. To pay the seller for undesignated trees cut or injured through carelessness  
at the rate of \$----- each for trees measuring 10 to -----  
inches in diameter at stump height and \$----- each for trees -----  
inches or over in diameter.

6. To repair damage caused by logging to ditches, fences, bridges, roads, trails  
or other improvements damaged beyond ordinary wear and tear.

7. Not to assign this agreement in whole or in part without the written con-  
sent of the seller.

B. The seller agrees to the following:

1. To guarantee title to the forest products covered by this agreement and to defend it against all claims at his expense.

2. To allow the purchaser to use unmerchantable material from tops of trees cut or from trees of \_\_\_\_\_ species for necessary logging improvement free of charge, provided such improvements are left in place by the purchaser.

3. To grant the freedom of entry and right-of-way to the purchaser and his employees on and across the area covered by this agreement and also other privileges usually extended to purchasers of stumpage which are not specifically covered, provided they do not conflict with specific provisions of this agreement.

C. In case of dispute over the terms of this agreement we agree to accept the decision of an arbitration board of three selected persons as final. Each of the contracting parties will select one person and the two selected will select a third to form this board.

Signed in duplicate this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_.

-----  
(Purchaser)

-----  
(Witness)

-----  
(Witness)

-----  
(Seller)

-----  
(Witness)

-----  
(Witness)

This contract would need to be changed to suit the conditions for other types of timber sales or for sales of delivered forest products.

## PROTECT YOUR FOREST

There is little use of improving your woodland and in cutting carefully unless you also protect the trees.

**Fire is the number one danger—keep it out!** You can't get a continuous yield of pine and high-quality hardwoods from your woodland unless fires are kept out of it and desirable young trees are given a chance to develop (fig. 14).

Fire destroys the pine seedlings that have just started and kills hardwood seedlings and sprouts back to the ground. Very hot fires, especially those that burn in the spring and summer, may kill older trees, even those of sawlog size. Many more trees, especially hardwoods, are damaged but not killed by fires. Fire scars allow the entrance of decay. When the needles or leaves are burned off, the growth is greatly reduced, even though the tree is not killed. Also the soil is likely to erode on areas that are burned regularly.

How can a woodland be protected from fire?

1. **Build firebreaks.** A solid plowed line or two plowed lines with grass and brush between them burned off will stop many fires and serve as a break from which to backfire (fig. 15).

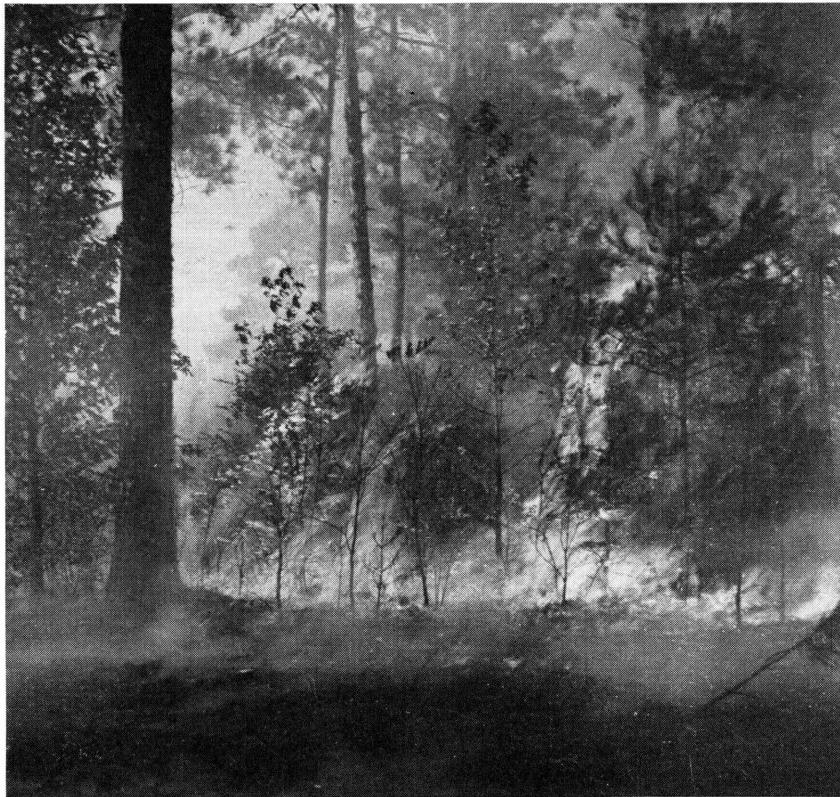
2. **See that no fires start.** Brush and grass fires are common causes of forest fires. Be careful not to let them spread into the forest.

3. **Keep some simple fire-fighting tools handy**—a hoe, rake, a fire flap made by fastening a piece of old belting to a hoe handle—in case they are needed in a hurry.

**4. Use your influence with your neighbors** to see that they do not let fires get away.

**5. Cooperate with the State and anyone** who is trying to protect forest lands, by extinguishing all uncontrolled woods fires you can and by notifying local State fire fighters of suspicious-looking smoke.

**Insects and diseases usually are not serious.** Losses from insect damage to standing timber are usually light enough so that you can log safely at any season of the year.



F-428699

**FIGURE 14.—**Fires destroy all seedlings and damage pulpwood-size and sawlog-size trees. One hot fire can destroy years of hard work and rob you of the profits from your timber.

Beetles, however, sometimes attack and kill pine trees. Several diseases also attack both pine and hardwoods, but usually they are not serious. If you see pines with brown needles, with cankers or pitch tubes on the trunk, or with a sickly appearance, promptly consult your local forester.

Good insurance against damage by insects and diseases is a **HEALTHY FOREST**—such as can be developed by good cutting, and by fire protection.



F-41984

FIGURE 15.—Build a fire line to protect your forest from fire. A solid plowed line or two plowed lines with the grass between them burned off will stop many fires.

## RECORDS OF YOUR BUSINESS

The management of your woodland, as outlined in the foregoing pages, is a business. To run it as a good businessman would, you will want to keep good records of all money received and paid out each year.

Some of the things you do in managing your woodland will bring you a greater hourly wage than others. If you want to know how much you are making from each operation, keep separate records for cutting of logs, trucking them to a mill, cutting pulpwood from tops, etc. You may find that the cash received from some of these jobs is hardly worth the time they require, but you may be surprised to find how much you are making an hour from some of the others. If the time you can spare on your woodland is limited, you will be able to spend it on the jobs that bring the greatest hourly return if you keep records in this way.

At least once a year, for your income tax report, you will balance costs against incomes. But you may be interested in keeping more records than that. Besides cash sales, you may want to credit as income the value of fuel wood, fence posts, and other products from the forest that you use at home. Besides out-of-pocket costs, it helps to know how much time you put in, and also the time of your team and truck, for which no daily wages are paid. Balancing these incomes against costs will show how well you were paid for this time. Probably it is more per hour than you can earn from farming your other crops.

Don't forget too that the volume added to your timber growing stock is part of the earnings. It has a value, just like money in the bank, and it is growing at compound interest just like any other sound investment you would make.

## MORE HELP IF YOU WANT IT

This small bulletin can give only the bare outline of successful forestry.

For on-the-spot advice on your own particular woodland, get in touch with your State Forester or Extension Forester, or your local Forester if you have one. Write the State Forester at your State capital, or State Extension Forester at the State Agricultural College. Your County Agricultural Agent also will know where to get help.

The United States Forest Service will be glad to send more information if you want it.

**WHEN YOU GET YOUR FOREST INTO FULL PRODUCTION, YOU'LL PROFIT FROM IT. GO TO IT!**

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